

What is claimed is:

1. A fuzzy inference system for processing information from a plurality of inputs that are associated with one or more physical phenomena, said plurality of inputs being described as an input set including a plurality of possible values wherein at least one or more of said plurality of inputs has uncertainty as to which of said plurality of possible values is the actual value of said at least one or more inputs, said fuzzy inference system comprising:

a rule decomposer comprising a plurality of rules, each of said rules being utilized for producing an output in response to said plurality of inputs to thereby produce a plurality of rule decomposer outputs; and

a union operator for determining a conjunction of said plurality of rule decomposer outputs to produce a fuzzy inference output.

2. The system of claim 1 wherein said each of said plurality of rules has an *IF* - *THEN* format.

3. The system of claim 1 wherein said fuzzy inference system for processing information is of utility in processing an input to a control system, the fuzzy inference system further comprising:

said fuzzy inference output of said fuzzy inference system being applied as an input to a control system.

4. The system of claim 3 wherein said fuzzy inference system for processing information is of special utility in processing an input to an intercept guidance control system for an undersea self-guided missile, the fuzzy inference system further comprising:

said fuzzy inference output being applied to said intercept guidance control system to improve performance in presence of the physical phenomena.

5. The system of claim 1 further comprising:

a dynamic RAM storage utilized for storing precomputed rule decomposer outputs.

6. The system of claim 5 wherein said union operator is described mathematically by an equation of the form:

$$M_{\mu_a}(y) = \bigcup_{i=1}^M \mu_i(y).$$

7. A fuzzy logic method for utilizing uncertain input data that has an uncertain value contained within an input set of possible values, said uncertain input data being associated with one or more physical phenomena, said method comprising the steps of:

providing a plurality of fuzzy inference rules;

producing a plurality of rule outputs in response to said uncertain input data; and

inferring a fuzzy inference by determining a conjunction of said plurality of rule outputs.

8. The method of claim 7 further comprising:

operating on said input set of possible values to produce a rule output for each of said plurality of rules.

9. The method of Claim 7 further comprising:

precalculating said plurality of rule outputs.

10. The method of claim 9 further comprising:

storing a result of said step of precalculating in RAM
memory.

11. The method of claim 7 wherein said fuzzy logic method for processing information is of special utility in assisting a military commander in making combat control decisions, the fuzzy logic method further comprising the step of:

producing a tactical picture that incorporates said output
from said fuzzy inference system.

12. The method of claim 7 wherein said conjunction is
determined mathematically by utilizing an equation of the form:

$$M_{\mu_a}(y) = \bigcup_{i=1}^M \mu_i(y).$$

13. A method for a fuzzy inference system for utilizing uncertain input data that has an uncertain value contained within an input set of possible values, said uncertain input data being associated with one or more physical phenomena, said method comprising the steps of:

producing a plurality of one dimensional solutions in response to said uncertain input data; and

inferring a fuzzy inference output by determining a conjunction of said one-dimensional solutions.

14. The method of claim 13 wherein said fuzzy logic method for utilizing uncertain input data is of special utility in assisting a military commander in making combat control decisions, the fuzzy logic method further comprising the step of generating from said fuzzy inference output a tactical picture display which represents uncertainty associated with the physical phenomena.

15. The method of claim 13 further comprising:

producing said plurality of one-dimensional solutions from
a plurality of rules.

16. The method of claim 15 further comprising:

producing a respective one-dimensional solution from a
respective rule.

17. The method of claim 14 further comprising:

the tactical picture display generated from said fuzzy
inference output further depicting a range of
possibilities for the military commander to chose
among.

18. The method of claim 13 wherein said step of determining a
conjunction of said one dimensional solutions is described by a
mathematical equation of the form:

$$M_{\mu_s}(y) = \bigcup_{i=1}^M \mu_i(y).$$